APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/027,397	12/19/2001	Linda J. Rankin	42390P12338	1176

		EXAMINER
7590	12/04/2003	SONG, JASMINE

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ART UNIT	PAPER NUMBER
2188	

DATE MAILED: 12/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on <u>19 December 2001</u>.

2a) ☐ This action is **FINAL**.   2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
   closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) <u>1-27</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) <u>1-27</u> is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on <u>19 December 2001</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
      application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application)
   since a specific reference was included in the first sentence of the specification or in an Application Data Sheet.
   37 CFR 1.78.

    a) ☐ The translation of the foreign language provisional application has been received.

14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific
   reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)   4) ☐ Interview Summary (PTO-413) Paper No(s). _____.

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)   5) ☐ Notice of Informal Patent Application (PTO-152)

3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>4</u>.   6) ☐ Other: .

Detailed Action

1.   Claims 1-27 are represented for examination.

Specification

2.   The lengthy specification has not been checked to the extent necessary to

determine the presence of all possible minor errors. Applicant's cooperation is

requested in correcting any errors of which applicant may become aware in the

specification.

3.   The applicant should insert "Brief summary of the invention" in the specification.

See MPEP 608.01(a) and 608.01(d).

Drawings

4.   The drawings filed on 12/19/2001 have been approved by the Examiner.

Oath/Declaration

5.   The applicant's oath/declaration has been reviewed by the examiner and is found

to conform to the requirements prescribed in 37 C.F.R. 1.63.

Information Disclosure Statement

6.   The information disclosure statement (IDS) submitted on 12/19/2001 is in

compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure

statement is being considered by the examiner.

Abstract

7.   Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the **range of 50 to 150 words**. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

The applicant should change the abstract in narrative form and generally limited to a single paragraph within the range of 50 to 150 words, the abstract should not exceed 25 lines of text.

See MPEP 608.01 (b).

Claim Rejections - 35 USC § 102

8.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless —
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9.   Claim 13 is rejected under 35 U.S.C. 102(e) as being anticipated by Khare et al.,

US 2003/0131202 A1.

Regarding claim 13, Khare teaches that a machine readable medium processing

snoop transactions comprising a plurality of instructions that in response to being

executed result in a computing device (col.2, section 0018) causing caching agents

(Fig.1, the processor nodes 110) associated with a coupler of the computing device

(Fig.1, scalability port switch 160) to write back modified lines to a memory of the

computing device (col.5, section 0045, lines 1-4); and updating a valid vector to indicate

that the coupler is no longer associated with one or more valid caching agents (col.5,

section 0045, lines 4-8).

Claim Rejections - 35 USC § 103

10.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11.   Claims 1-12 and 17-27 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Bealkowski et al., US 6282596 B1, in view of Khare et al., US

2003/0131202 A1.

Regarding claim 1, Bealkowski teaches that a method comprising receiving a

request (Fig.5, step 142) to remove a hot plug module (Figl.5, step 142, removing a hot

plug module is taught as removing a processor subsystem, col.4, lines 15-21) from a

running computing device (hot plugging is a feature that the configuration of a computer

system may be altered without rebooting, col.1, lines 57-61);

Bealkowaski does not specifically teach updating a snoop filter of the running computing device, he only teaches that the caches of the processor are flushed and the processor is set to idle, which means to cease snooping of the hot plug module (col.9, lines 42-45).

However, Khare et al teach that updating a snoop filter of the running computing device (col.4, section 0036, last 10 lines).

As taught by Khare, the use of the snoop filter tracks the tag and the state of caches at all the caching agents in order to maintain coherency of the computer system (col.1, section 0006, last five lines and section 0007). It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the teachings of Khare in the system of Bealkowaski and utilize a snoop filter for the advantages stated above.

Accordingly, one of ordinary skill in the art would have recognized this and concluded that they are from the same field of endeavor. This would have motivated one of ordinary skill in the art to implement the above combination for the advantages set forth above.

Regarding claim 2, Khare further teaches that updating comprises updating the snoop filter to indicate that the hot plug module is no longer a valid snooping agent (col.3, sections 0029, lines 3-20).

Regarding claim 3, Khare further teaches that updating comprises updating a

valid vector (it is taught as the bit is set in the present vector) to indicate that the hot

plug module is not a valid snooping agent (it is taught as the cache line is set invalid

status).

Regarding claim 4, Khare further teaches that updating comprises disabling the

snoop filter associated with the hot plug module (it is taught as flushing requirement

invalidates all cache line col.5, section 0045).

Regarding claim 5, Khare further teaches that updating comprises marking all

cache lines tracked by the snoop filter (it is taught as all cache lines has the

corresponding bit in the present vector and are set as different status such as Invalid,

Shared or Exclusive) as not being present in the hot plug module (it is taught as the

Exclusive access to the cache line as indicated by the present vector).

Regarding claim 6, Khare further teaches that updating comprises updating

presence vectors to indicate that associated cache lines are not present in the hot plug

module (it is taught as the Exclusive access to the cache line as indicated by the

present vector).

Regarding claim 7, Bealkowski teaches that a midplane comprising

a plurality of couplers (Fig.3b, CPU connectors 14a-14d) to detachably couple

hot plug modules (each processor and associated VRM which will be termed a

processor subsystem, col.4, lines 17-21) to a running computing device (hot plugging is

a feature that the configuration of a computer system may be altered without rebooting,

col.1, lines 57-61); and Bealkowski also teaches that removing a hog plug module from

the running computer device (Figl.5, step 142, removing a hot plug module is taught as

removing a processor subsystem, col.4, lines 15-21). Bealkowaski does not specifically

teach a switch to interconnect the plurality of couplers and to cease issuing snoop

transactions, he only teaches that the caches of the processor are flushed and the

processor is set to idle, which means to cease snooping of the hot plug module (col.9,

lines 42-45).

However, Khare et al teach that a switch (Fgi.1, SPS 160 which includes a snoop

filter) to interconnect the plurality of couplers (Fig.1) to updating a snoop filter of the

running computing device (col.4, section 0036, last 10 lines).

As taught by Khare, the use of the snoop filter tracks the tag and the state of

caches at all the caching agents in order to maintain coherency of the computer

system (col.1, section 0006, last five lines and section 0007). It would have been

obvious to one having ordinary skill in the art at the time the invention was made to

utilize the teachings of Khare in the system of Bealkowaski and utilize a snoop filter for

the advantages stated above.

Accordingly, one of ordinary skill in the art would have recognized this and

concluded that they are from the same field of endeavor. This would have motivated

one of ordinary skill in the art to implement the above combination for the advantages

set forth above.

Regarding claim 8, Khare teaches that the switch causes the hot plug module to

be removed to write modified cache lines to a memory of the running computing device

(it is taught as updating a modified cache line which referred to as an implicit write-back,

col.4, section 0036, lines 25-27).

Regarding claim 9, Khare teaches that the switch comprises a valid vector (it is

taught as the bit is set in the present vector), and the switch issues snoop transactions

only to couplers that the valid vector indicates are associated with valid snooping agents

(col.2-3, section 0029, lines 17-19).

Regarding claim 10, Khare teaches that the switch comprises presence vector

(col.2-3, section 0029, lines 15-17) associated with cache lines (col.3, section 0029,

lines 17-19) of the hot plug module to be removed, and the switch updates the presence

vectors to indicate that the hot plug module does not have copies of the associated

cache lines (it is taught as updating the presence vectors when the associated cache

line is set Invalid, section 0029).

Regarding claim 11, Khare teaches that the switch comprises a different snoop

filter for each coupler of the plurality of couplers (Fig.1), and the switch disables the

snoop filter for the coupler associated with the hot plug module to be removed (col.4,

section 0036, lines 10-18).

Regarding claim 12, Khare teaches that further comprising another switch to

interconnect the plurality of couplers, wherein the switches collectively track states of

cache lines of hot plug modules coupled to the couplers (col.3, section 0030) and cease

to issue snoop transactions to the coupler associated with the hot plug module to be

removed (it is taught as flush the cache lines in order to invalidate all cache line states).

Regarding claim 17, Bealkowski teaches that a computing device comprising,

a memory (cache memory, col.4, lines 3-6),

a hot plug module (a processor subsystem, col.4, lines 17-21) comprising a

coupler (CPU connectors as shown in Fig.1) and one or more caching agents (each

processor with the associated cache) having cached lines of the memory; a midplane

comprising a coupler detachably coupled the coupler of the hot plug module (Fig.1), and

Bealkowski also teaches that removing a hog plug module from the running computer

device (Figl.5, step 142, removing a hot plug module is taught as removing a processor

subsystem, col.4, lines 15-21). Bealkowaski does not specifically teach a snoop filter to

track the cached lines of the one or more caching agents and updating the snoop filter;

he only teaches that the caches of the processor are flushed and the processor is set to

idle, which means to cease snooping of the hot plug module (col.9, lines 42-45).

However, Khare et al teach a snoop filter to track the cached lines of the one or more caching agents (col.3, section 0030) and updating a snoop filter of the running computing device (col.4, section 0036, last 10 lines).

As taught by Khare, the use of the snoop filter tracks the tag and the state of caches at all the caching agents and updating the snoop filter in order to maintain coherency of the computer system (col.1, section 0006, last five lines and section 0007). It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the teachings of Khare in the system of Bealkowaski and utilize a snoop filter for the advantages stated above.

Accordingly, one of ordinary skill in the art would have recognized this and concluded that they are from the same field of endeavor. This would have motivated one of ordinary skill in the art to implement the above combination for the advantages set forth above.

Regarding claim 18, Bealkowski teaches that the hot plug module comprises a mechanism to generate the request to remove the hot plug module (Fig.5, col.9, lines 35-38).

Regarding claim 19, Bealkowski teaches that the memory comprises a plurality of instructions that in response to being executed result in the request to remove the hot plug module being generated (col.9, lines 47-51).

Regarding claim 20, Bealkowski teaches that the one or more caching agents (processor subsystem) comprises a processor and one or more associated memory caches (col.4,lines 3-6).

Regarding claim 21, Khare teaches that the one or more caching agents comprises an input/output hub and one or more associated memory caches (Fig.1).

Regarding claims 22-23, Bealkowski teaches that a high level logic flowchart of a process for controlling the addition and the removal of hot-plug processor subsystems (Fig.4 and Fig.5), Bealkowshi does not teach that a snoop filter comprising storage to store coherency information for lines cached by caching agents and updating the coherency information, Bealkowshi only teaches that the caches of the processor are flushed and the processor is set to idle at the removing operation of the processing (col.9, lines 42-45). However, Khare teaches that a snoop filter comprising storage to store coherency information for lines cached by caching agents (col.2, section 0029, lines 3-7) and updating the coherency information (col.4, section 0036, last 10 lines) As taught by Khare, the use of coherent information of the snoop filter tracks the tag and the state of caches at all the caching agents and updating the coherency information for reflecting the current status of the corresponding cache line, therefore, improving the speed of the data received from the responding node, and resource of usage is decrease due to having the snoop filter, the system know the current status of the cache lines to maintain the cache coherent (col.1, section 0005, last five lines and

section 0032, lines 15-17). It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the teachings of Khare in the system of Bealkowski and utilize a snoop filter for the advantages stated above.

Accordingly, one of ordinary skill in the art would have recognized this and concluded that they are from the same field of endeavor. This would have motivated one of ordinary skill in the art to implement the above combination for the advantages set forth above.

Regarding claim 24, Khare teaches that the controller updates the coherency information to indicate that the hot plug module is no longer a valid snooping agent (col.3, sections 0029, lines 3-20) in response to the request to remove the hot plug module.

Regarding claim 25, Khare teaches that the controller updates a valid vector of the coherency information to indicate that the hot plug module is no longer a valid snooping agent (col.3, sections 0029, lines 3-20) in response to the request to remove the hot plug module.

Regarding claim 26, Khare teaches that the controller updates the coherency information by marking all tracked cache as not being present (col.3, section 0031, lines 12-16) in the hot plug module in response to the request to remove the hot plug module.

Regarding claim 27, Khare teaches that the controller updates the coherency

information by updating presence vectors to indicate that associated cache lines are not

present (col.2, section 0029, lines 3-19) in the hot plug module in response to the

request to remove the hot plug module.

12.   Claims 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over

as applied to claim 13, and

Khare et al., US 2003/0131202 A1, further in view of Bealkowski et al., US 6282596 B1.
                              ^

Regarding claim 14, Khare teaches the claimed invention (claim 13), Khare does

not teach the processors are a hot-plugging processors. However, Bealkowski teaches

that an improved method and system for hot-plugging processors in a data processing

system (col.1, lines 7-11). As taught by Bealkowski, with the advent of hot-plug

adapter, the configuration of a computer system may be altered without rebooting

(col.1, lines 57-62). It would have been obvious to one having ordinary skill in the art at

the time the invention was made to utilize the teachings of Bealkowski in the system of

Khare and provide a hot-plugging configuration for the advantages stated above.

Accordingly, one of ordinary skill in the art would have recognized this and

concluded that they are from the same field of endeavor. This would have motivated

one of ordinary skill in the art to implement the above combination for the advantages

set forth above.

Regarding claim 15, Khare teaches that the plurality of instructions in

response to being executed further result in the computing device updating the valid

vector to indicate that another coupler of the computing device is now associated with

one or more valid caching agents in response to a hot plug addition request (Fig.4).

Regarding claim 16, Khare teaches that the plurality of instructions in response

to being executed further result in the computing device clearing a bit of the valid vector

that is associated with the coupler to indicate that the coupler is no longer associated

with one or more valid caching agents, and setting another bit of the valid vector that is

associated with the another coupler to indicate that the another coupler is associated

with one or more valid caching agents (col.2, section 0029 to col.3, section 0031).

Conclusion

13.   The prior art made of record and not relied upon is considered pertinent to

applicant's disclosure.

Emerson et al	US 6487623 B1
Neil et al	US 6564279 B1
Reid	US 6529987 B1
Piccirillo et al	US 2003/0101314 A1
Richard et al	US 2003/0093630 A1
Olarig et al	US 6587909 B1
Olarig et al	US 6098132

14.   When responding to the office action, Applicant is advised to clearly point out the

patentable novelty which he or she thinks the claims present in view of the state of the

art disclosed by the references cited or the objections made. He or she must also show

how the amendments avoid such references or objections. See 37 C.F.R. 1.111 (c).

15.   When responding to the office action, Applicants are advised to provide the

examiner with the line numbers and page numbers in the application and/or references

cited to assist examiner to locate the appropriate paragraphs.

16.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Jasmine Song whose telephone number is 703-305-

7701. The examiner can normally be reached on 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Mano Padmanabhan can be reached on 703-306-2903. The fax phone

numbers for the organization where this application or proceeding is assigned are 703-
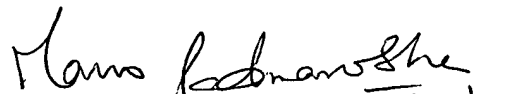
872-9306.

Any inquiry of a general nature or relating to the status of this application or

proceeding should be directed to the receptionist whose telephone number is 703-305-

3900.

Jasmine Song

Patent Examiner

November 28, 2003

Mano Padmanabhan   11/30/03

Supervisory Patent Examiner

Technology Center 2100